

cargo container

B1 — 7. (new) A method for producing an x-ray scatter image of a ~~large object~~, the method comprising:

(a) providing a device having:

- A2
- (i) a bed reversibly moveable along a horizontal direction;
 - (ii) a source of penetrating radiation, mounted on the bed, for providing a beam characterized by an adjustable beam axis;
 - (iii) a motorized drive for moving the bed in the first direction; and
 - (iv) at least one scatter detector mounted on the bed and having a signal output;

(b) using the motorized drive to move the device past the cargo container so as to cause any contents of the cargo container to be scanned by the beam; and

(c) processing the signal from the signal output of the scatter detector as the bed is moved forward and backward along the horizontal direction to form an image of the contents of the cargo container. —

Remarks

Claim 1 and new claims 2-7 are pending in the application. Of these, claim 1 stands rejected under 35 U.S.C. § 102(e) or 35 U.S.C. § 103 as either anticipated by, or obvious over, Husseiny '029.

Briefly, embodiments of the invention provide an apparatus and method for imaging the interiors of large cargo containers, including cars and trucks. A vehicle, providing over-road mobility as well as the capability to scan long objects, contains an

x-ray source and one or more x-ray detectors. By detecting scattered radiation, the apparatus and method claimed may determine not only the visual aspect of the x-ray attenuation of the contents of the container but also the distribution of contents having low x-ray attenuation but substantial x-ray scatter cross-section. Additionally, embodiments of the present invention claimed in the pending claims may also provide enhanced image interpretation based, for example, on discrimination of material properties such as atomic number.

Claim 1 has been amended and claims 2-7 have been added to encompass patentable subject matter described in the application to which claims have not been drawn in the present or predecessor applications.

In particular, claim 1 now requires that the bed of the device for inspecting a cargo container with penetrating radiation be reversibly moveable. Advantages of bi-directional scanning, with alternate forward and reverse passes, are discussed in the last paragraph of p. 11 of the application. The subject matter of claim 1 prior to amendment is believed by Applicants to be substantially subsumed by one or more claims of patents related to the present application, and amendment of claim 1 is made without concession of anticipation or obviousness over any prior art.

New claim 2 requires additionally that the source of penetrating radiation be characterized by a source axis adjustable over a range of angles about the horizontal. Adjustability of the source axis and advantages that may accrue therefrom in the inspection of cargo containers is discussed in the application at p. 11, lines 20-23. The

use of a remotely operated actuator for setting a desired x-ray beam angle, as claimed in new claim 3, is discussed at p. 15, lines 3-6.

New claim 4 requires an interlock for disabling the source of penetrating radiation unless the bed is in motion, as described at p. 14, lines 7-10.

Husseiny

The cited Husseiny reference describes four clearly distinct x-ray inspection modalities which are referred to in the Husseiny patent as 'aspects' of the subject matter claimed by Husseiny. The four x-ray inspection modalities of Husseiny are mutually exclusive, with the exception of the first and second which, as taught by Husseiny, may be employed in conjunction with one another. These 'aspects' should not be conflated or confounded, because there is no suggestion in Husseiny to do so. Indeed, Husseiny positively teaches distinction among them. The inspection modalities of Husseiny are enumerated as follows:

#1. The first embodiment described by Husseiny is discussed in the Summary between column 13, lines 1-44, and in the Detailed Description between column 17, line 45 and column 28, line 5. This embodiment provides for transmission imaging (shadowgraphs) of baggage that is moved slowly on a conveyor belt in front of an x-ray beam having dimensions of either ~2 mm, for high resolution, or ~ 4 mm × 25 mm, for coarser resolution. Additionally, x-ray diffraction, i.e., coherent scattering at discrete forward angles of monochromatic radiation (col. 21, lines 25ff), is employed for characterizing materials. The transmission radiography of moving baggage may also be

supplemented by ultrasonic analysis (beginning at col. 17, line 66) of persons.

#2. Hussein's Detailed Description of the second distinct embodiment

(Summary: col. 13, line 45 - col. 14, line 39) begins at col. 28, line 6, and continues through col. 37, line 45. The second distinct embodiment is a baggage handling system where objects are tracked by computer from the point of terminal or curb check-in to loading aboard an aircraft. Part of the tracking system entails characterization of the baggage using the transmission, backscatter, and x-ray diffraction modalities applied to baggage conveyed on a conveyor system according to the first embodiment.

#3. The third distinct embodiment of Hussein (Summary: col. 14, lines 40-51), the Detailed Description of which begins at col. 37, line 46 and ends at col. 39, line 33, is a portable probe used for inspection of concealed compartments aboard vessels for detection of drugs. Drugs are to be recognized based on the variation in the intensity of the backscatter, however there is no teaching in Hussein as to how an actual image might be obtained.

#4. Finally, the fourth distinct embodiment of Hussein (Summary: col. 14, lines 52-46) is described in detail between col. 39, line 34 and the end of the Detailed Description, at col. 46. This aspect of the Hussein invention is a dual-energy backscatter imaging system in which a beam is laterally scanned across a transverse swatch of the ground as a source and a detector are propelled in a forward direction on an all terrain vehicle remotely controlled by an operator.

Hussein's Fig. 40, to which the Examiner is understood to refer, shows a

motorized all-terrain vehicle carrying an x-ray detection system for sweeping the ground for land mines, in accordance with Aspect #4 of the Hussein description.

Element (a) of claim 1 of the present application requires a reversibly moveable bed to which a source of penetrating radiation and at least one scatter detector are mounted.

The reversible aspect of the bed, as required in claim 1, is neither taught nor suggested by the motorized inspection system for a land mine-sweeping application of Hussein. Anticipation of the currently pending claim by Hussein would require that reversibility of the bed be described. Such is not the case. Obviousness of the claim over Hussein would require that provision of a reversible beam be obvious to one of ordinary skill in the art at the time the invention was made. Examiner raises both grounds for rejection in the alternative.

A reversible bed for inspecting cargo containers is not obvious in the context of Hussein's land mine apparatus because it is essential, in detecting mines, that personnel be displaced, as far as possible, *behind* the region being scanned for land mines. It would be unsafe for a vehicle to scan for grounds in the direction headed toward personnel. The excerpt from Hussein (col. 1, lines 10-18) cited by the Examiner does not apply to the backscatter system (numbered Aspect #4, above) described with reference to Fig. 40; it is a summary of how the distinct Aspects of the Hussein patent are intended to be applicable. Hussein provides no enabling teaching for characterizing the contents of vehicles (where precision registration of the source beam

is required to allow resolution of contraband articles), and, indeed, where Hussein discusses cargo inspection, a distinction in operating modality is made and it is the cargo that is moved (in accordance with one of Aspects #1 and #2) of the Hussein patent) with respect to a fixed source and detector arrangement, as taught in col. 34, lines 42ff, and as conventionally practiced in the prior art relating to cargo inspection.

Similarly, new claims 2-7 are believed to be allowable over all art of record.

Reexamination of this application as amended and allowance are respectfully requested.

Respectfully submitted,



Samuel J. Petuchowski
Registration No. 37,910
Attorney for Applicants

Bromberg & Sunstein LLP
125 Summer Street
Boston, MA 02110-1618
(617) 443-9292

98946